AFCEC Energy Directorate

Energy is a directorate of the Air Force Civil Engineer Center - East, a field operating agency of the Air Force Civil Engineer. It consists of engineers, energy experts, contract officers and support staff who provide expertise to installations and major commands. AFCEC's Energy Directorate identifies, evaluates and helps implement technologies and funding strategies to reduce Air Force energy consumption and costs to meet federal energy goals.

BUILDING THE AIR FORCE RENEWABLE ENERGY PORTFOLIO

Meeting the 2015 Energy Goals

The Air Force has made energy efficiency a focus for decades, reducing facility energy intensity 30% in a 20-year period ending in 2005. But the issue has garnered special interest in recent years. From 2001 to 2006, the Air Force reduced energy consumption 8%, even as energy costs grew by more than 40%. This alarming trend grabbed the attention of lawmakers who passed several pieces of legislation including the Energy Policy Act of 2005 and the National Defense Authorization Acts of 2007, 2008, and 2010. Another important energy document is Executive Order 13423, signed by the President in 2007. These mandates established a renewable energy goal of 7.5% by 2013 for all federal facilities and 25% by 2025 for the Department of Defense. In order to contribute to these goals the Air Force is expanding efforts to increase its renewable energy portfolio.

The Assistant Secretary of Air Force for Installations, Environment, and Logistics published the Air Force Energy Plan 2010 which includes guidance to expand the use of renewable energy in the Air Force. AFCEC is working in conjunction with major commands and bases to successfully execute the plan and meet the renewable energy goals.

Three Steps to Meeting Goals

The Infrastructure Energy Implementation Plan includes a 3-step approach for achieving renewable energy goals.

Step 1. Development of on-site renewable energy resources to the extent economically and technically feasible

In fiscal year 2011, AFCEC will manage renewable energy assessments of almost every Air Force installation in the continental United States to identify possible renewable energy projects. These projects will be either Air Force owned or third-party owned. For projects that are third-party owned, the Air Force will execute a Power Purchase Agreement (PPA) and purchase the energy from the owner. Evaluation factors for determining whether a project is feasible include resource availability, economics, land availability, mission impact, and support from the utility company.

Renewable Energy Resource: Developing quality renewable energy resources is often not a simple process. For example, due to regional differences in solar intensity, a photovoltaic array in Nevada would produce significantly more power than an identical project in the 'sunshine' state of Florida, and far more than in a northern-tier state such as Ohio or Pennsylvania.

Economics: Savings-to-investment ratio, state incentives, and the current cost of electricity are all considered when evaluating renewable projects. If a given installation currently pays $0.02 per kWh, building a renewable energy project that will result in $0.12 per kWh cannot typically be justified.

Photovoltaic Array at Buckley AFB, Colorado

Land Availability: The installation must have property available that can be allocated for a renewable energy project.

Mission Impact: Potential impact to an installation's mission must be considered. For example, high-elevation wind generators can cause major problems when placed near runways due to air space and potential radar interference.

Utility Company Support: Some states require utility companies to include renewable energy in their power supply portfolio. This leads to increased support from utility companies for Air Force energy goals.

The AFCEC, in conjunction with bases and major commands, has identified 30 photovoltaic, wind, waste-to-energy, geothermal, landfill gas, and biomass projects (as of September 2011). The funding mechanism for these projects will be third-party contracts and could total nearly $400M.

Step 2. Procurement of renewable power from off-site resources delivered over the power grid

Commercial renewable power, which is purchased from off-base sources, also makes up a large part of the Air Force renewable energy portfolio and helps us reach the goals. Approximately 15% of the Air Force electricity requirement can be purchased from an off-base source other than the local utility. Renewable energy is produced and sent directly to the base. Fifteen "open" states and the District of Columbia allow the competitive purchase of electricity.

Step 3. Purchase of Renewable Energy Certificates (RECs)

RECs are the environmental attributes of the energy generated from renewable energy projects. Third-party developers may construct an on-base project and sell the generated electricity to the installation. In order to create an economically viable project, the owners may sell the high value RECs to a local utility, but once the RECs are sold, the power supplied to the Air Force from the original owners is no longer considered "green" and will not count towards the Department of Defense renewable goals.

The first reason the Air Force must purchase RECs is to replace the RECs sold from on-base PPA generation. The Air Force is able to purchase inexpensive RECs on the national market to replace the local RECs that were sold, once again making the power "green." In addition, the Air Force can now benefit from a provision of the EPAct of 2005, which provides additional incentives for on-base renewable energy projects. When renewable energy is both generated and used on-base and the RECs are either retained or replaced, the energy generated counts twice towards the goals.

The second reason RECs are purchased is to meet the annual renewable energy goals. If the renewable energy from on-base projects and commercial purchases is short of the annual Air Force goal then national RECs are purchased to meet the shortfall.

In coordination with MAJCOM energy managers, AFCEC identifies the number of RECs required by the Air Force to meet goals, and coordinates an Air Force wide REC purchase through the Defense Energy Support Center. This consolidated purchase results in a lower price than individual purchases by MAJCOMs or installations.

Renewable Power Goal Under 10 U.S. Code 2911

Renewable Energy Electricity Requirements (MWh)

	FY13	FY14	FY15	FY16	FY17
RE goals	13%	14%	15%	16%	17%
RE electricity required (MWh)	1,179,155	1,257,161	1,333,488	1,408,164	1,481,212

Mechanisms to Reach RE Goals (MWh)

	FY13	FY14	FY15	FY16	FY17
On-base RE (carried fwd)	446,261	552,142	723,357	1,363,230	1,830,971
ECIP/SRM/ARRA (new on-base)	9,916	32,018	6,341	11,083	6,246
PPA RE (new on-base)	95,966	127,151	376,251	141,299	77,614
EUL RE (new on-base)	0	12,045	257,281	315,360	0
Commercial Bundled RE Purchase	54,899	54,899	54,899	169,899	169,899
Totals	607,041	778,256	1,418,129	2,000,870	2,084,730

EUL = Enhanced Use Lease, ECIP = Energy Conservation Investment Program, PPA = Power Purchase Agreement, SRM = Sustainment Restoration & Modernization

AFCEC Energy Project Development Process

- Evaluate resource and land availability (80 feasibility studies completed in FY10)
- Support MAJCOM/base with opportunity assessments
- Add candidates to renewable project list
- Prioritize potential project based on economics, mission impact, utility company support, base/MAJCOM project champion
- Engage with Air Force Real Property Agency on leasing requirements
- Allocate AFCEC resources to high priority projects

Funding Mechanisms

Government-Funded: Construction of a renewable energy project using government funds comes from the Energy Conservation Investment Program or Sustainment, Restoration, & Modernization funds using standard construction contract mechanisms.

Third-Party-Funded: Construction of a renewable energy project with financing provided by a private developer. The developer recoups the investment by the sale of power and renewable energy certificates. Power Purchase Agreements, Enhanced Use Lease, Energy Savings Performance Contracts, and Utility Energy Service Contracts are all potential contract mechanisms.

Interagency Agreements: For some installations, an agreement can be structured with Western Area Power Administration (WAPA) to purchase renewable electricity. WAPA purchases the output of a renewable energy facility constructed by a third party on behalf of an Air Force installation. The developer recoups the investment from the sale of power and RECs.

Commercial Power Purchase: The purchase of renewable electricity from a private developer with delivery through the local utility grid is a commercial power purchase.

Photovoltaic Roof Project at Los Angeles AFB, California

Geothermal Project at Minot AFB, North Dakota

Air Force Civil Engineer Center Renewable Energy Plan (10 USC 2911)

The implementation plan includes specific projects to meet these overarching targets:

1. Air Force electricity use estimated for FY12	9.3 million MWh
2. Projected electricity use in FY17	8.8 million MWh
3. Renewable energy 2017 goal is 17% of all electricity	1.5 million MWh
4. Current annual on-base renewable energy	0.3 million MWh
5. Identified on-base projects for study (annual)	2.4 million MWh

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Current On-Base Operational Renewable Energy Production (Smaller projects not listed)

Location	Source	MWh Annually
JBER Richardson, AK	Landfill Gas	38,972
Nellis AFB, NV	Solar PV	30,906
Hill AFB, UT	Landfill Gas	13,928
USAF Academy, CO	Solar PV	11,960
Edward AFB, CA	Solar PV	6,438
F.E. Warren AFB, WY	Wind	4,916
Otis ANGB, MMR, MA	Wind	3,103
Toledo ANGB, OH	Solar PV	1,913
Buckley AFB, CO	Solar PV	1,652
Burlington ANGB, VT	Solar PV	1,611
Rosencrans ANGB, MO	Solar PV	1,554
JB McGuire/Dix/Lakehurst, NJ	Solar PV	1,103
Los Angeles AFB, CA	Solar PV	931
Luke AFB, AZ	Solar PV	717
Fresno Yosemite ANGB, CA	Solar PV	629
March ARB, CA	Solar PV	600
Hill AFB, UT	Solar PV	330
Camp Perry ANGB	Solar PV	247

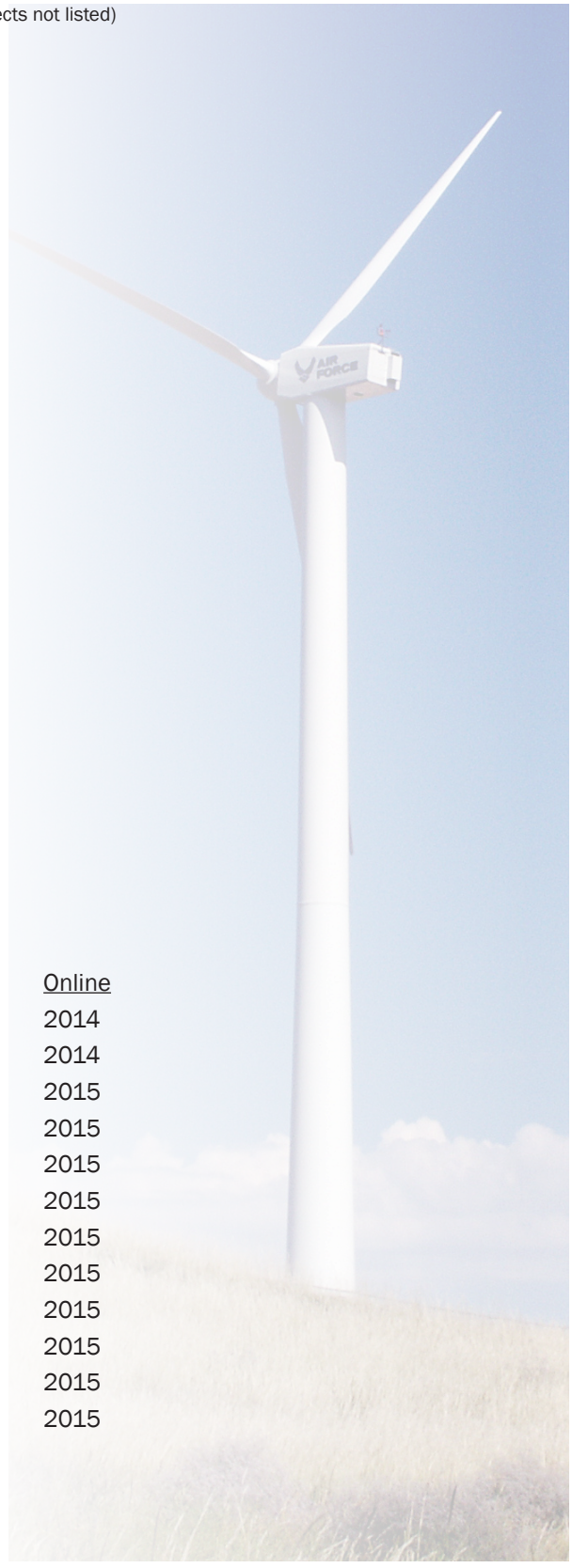
In Construction in 2013

Location	Source	KW Capacity
Davis-Monthan AFB, AZ	Solar PV	16,365
Pave Paws Cape Cod AFS, MA	Wind	3,360
Camp Perry ANGB, OH	Wind	650
Davis-Monthan AFB, AZ	Solar PV	180

Planned Renewable Electrical Generation

Location	Source	KW Capacity	Online
Otis ANGB, MMR, MA	Solar PV (PPA)	6,000	2014
JB San Antonio, TX	Solar PV (EUL)	5-15,000	2014
Luke AFB, AZ	Solar PV (EUL)	10,000	2015
Vandenberg AFB, CA	Solar PV (PPA)	10,000	2015
JB McGuire/Dix/LAKH, NJ	Solar PV (PPA)	10,000	2015
Sheppard AFB, TX	Solar PV (PPA)	3,000	2015
Hickam ANGB, HI	Solar PV (ECIP)	1,000	2015
Moody AFB, GA	Solar PV (EUL)	10,000	2015
Robins AFB, GA	Solar PV (EUL)	10,000	2015
Holloman AFB, NM	Solar PV (PPA)	3,100	2015
Laughlin AFB, TX	Solar PV (PPA)	10,000	2015
Aviano AB, Italy	Solar PV (ECIP)	1,000	2015

EUL = Enhanced Use Lease
PPA = Power Purchased Agreement
ECIP = Energy Conservation Investment Program



(AFCEC Renewable Energy Fact sheet 2014 as of 1/6 2014)